Surface Water and Storm Water Rules

MMSD Chapter 13

Enacted 1/1/02

Summary

- Utilize a uniform release rate approach across the District of 0.5 cfs/acre for the 1 percent probability event (100-year)
- Utilize a release rate of 0.15 cfs/acre for the 50 percent probability event (2-year)
- Provide technical guidance for case-by-case detailed analyses for system planning, regional storage (multi-site) facilities or other unique situations using a volumetric approach
- Communities may elect to apply more restrictive controls if they desire

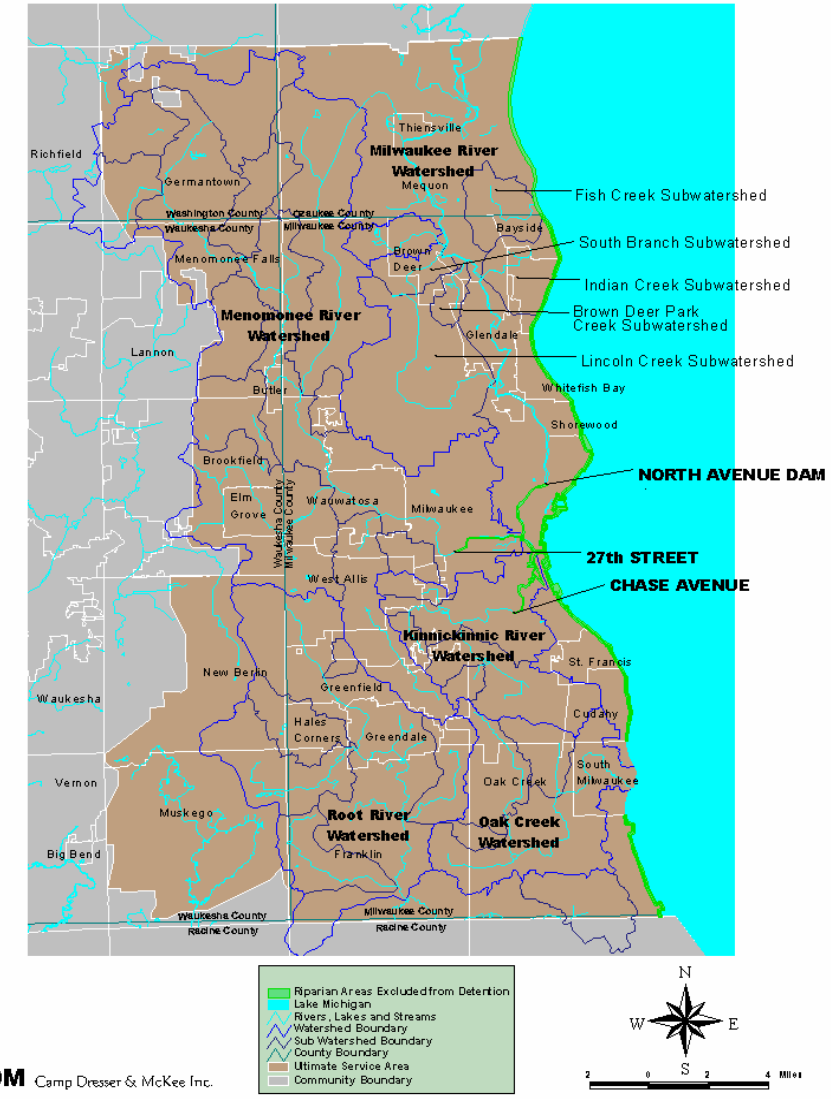
Purpose of the Rules

- Reduce unsafe conditions, property damage, economic losses, and adverse health effects caused by flooding
- Maximize the effectiveness of flood abatement facilities and watercourse improvements
- Reduce the number and magnitude of releases of sewage to the environment from sanitary and combined sewers and to protect sewage collection and treatment facilities from high flows
- Promote comprehensive watershed planning and intergovernmental cooperation
- Restore and enhance opportunities to use and enjoy watercourse resources

Applicability

- Applies to all users of the sewerage system and all governmental units in the sanitary sewer planning service area
- Applies to all developments that involve an increase of one-half acre or more of impervious surface except for sites riparian to Lake Michigan, the Kinnickinnic River, downstream of Chase Avenue, the Menomonee River, downstream of 27th Street, or the Milwaukee River, downstream of North Avenue

Figure 2 - Surface Water and Storm Water Rule Applicability



CDM Camp Dresser & McKee Inc.

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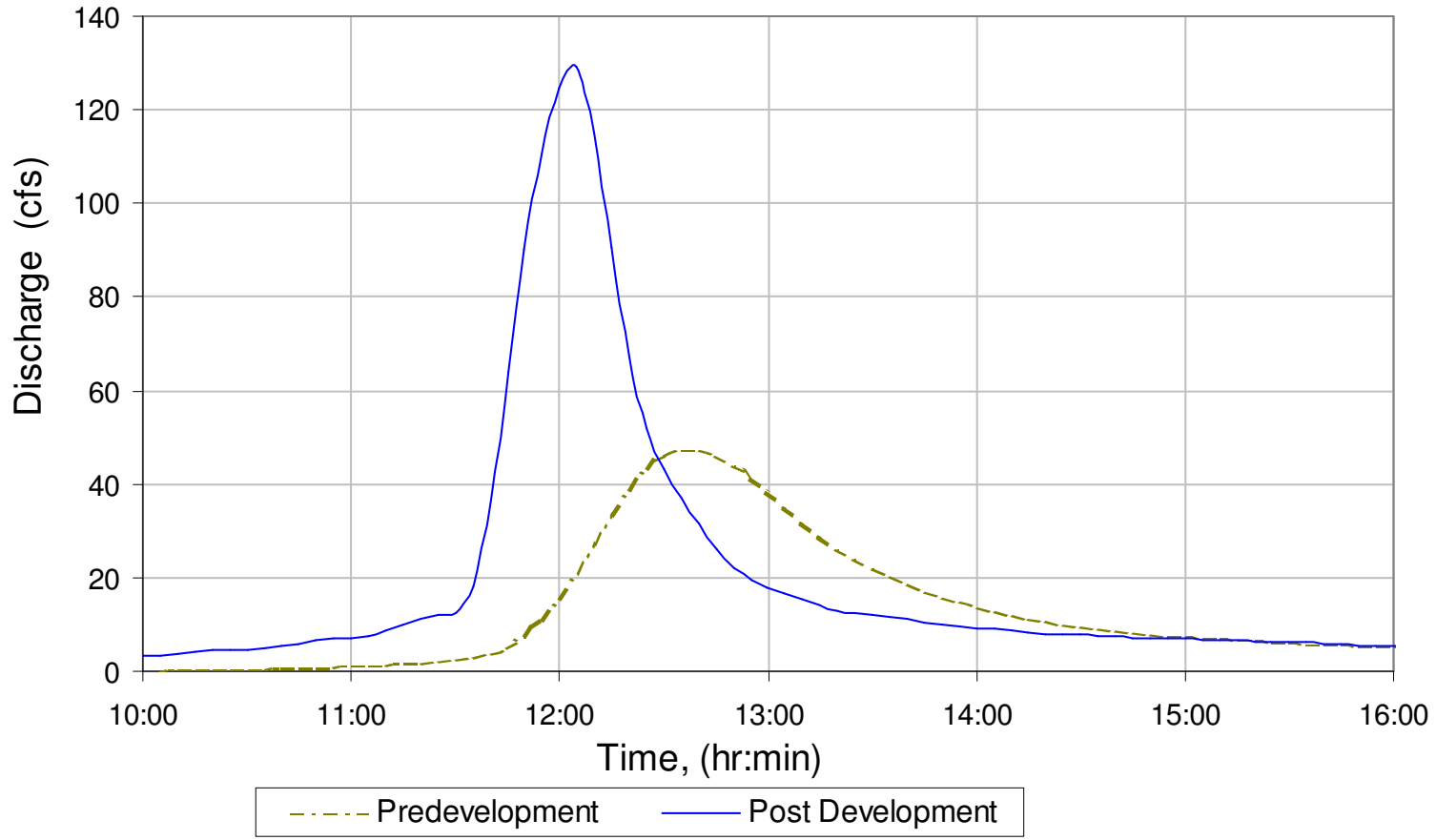
Need for Surface and Storm Water Rules

- Development significantly increases the peak flow (2 to 3 times) and volume of runoff (30 to 80 percent)
- WSMP showed increases in peak flow of as much as 20% to 30% for 2020 land use conditions without detention
- Many local stormwater rules were ineffective in controlling increased flows from increased runoff volumes

Figure 1 Hydrographs for Pre and Postdevelopment Land Conditions



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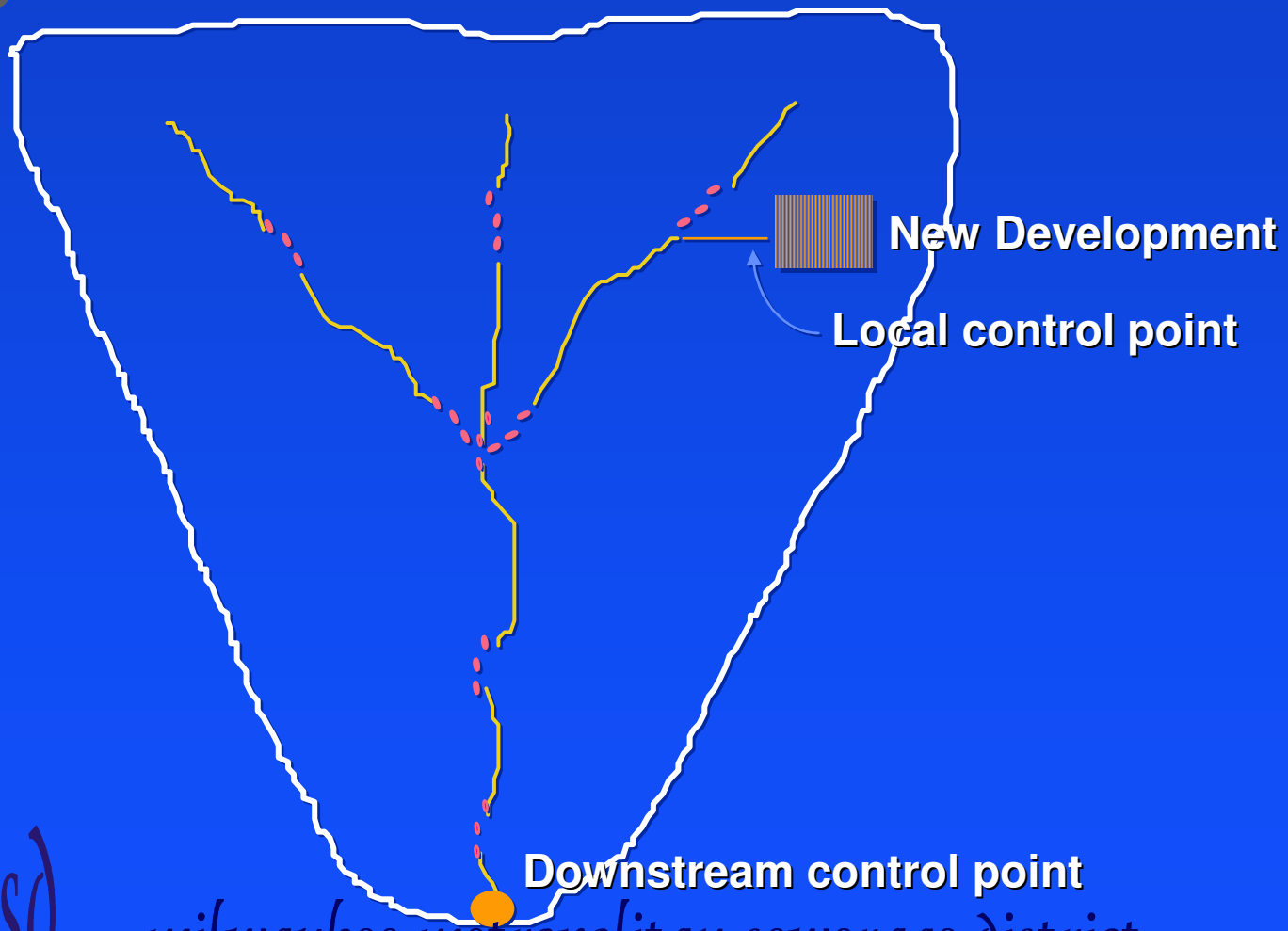
Detention Criteria Methodology

Maintain existing peak flow conditions throughout the watershed



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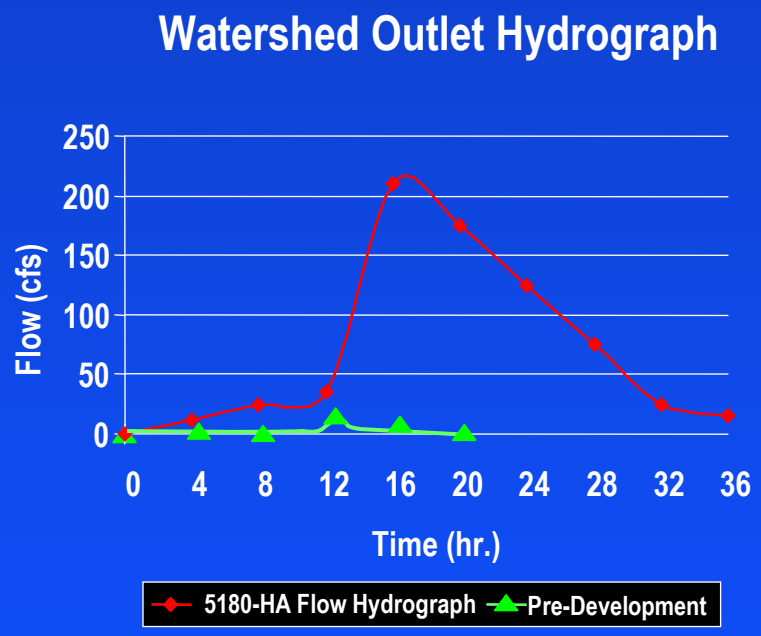
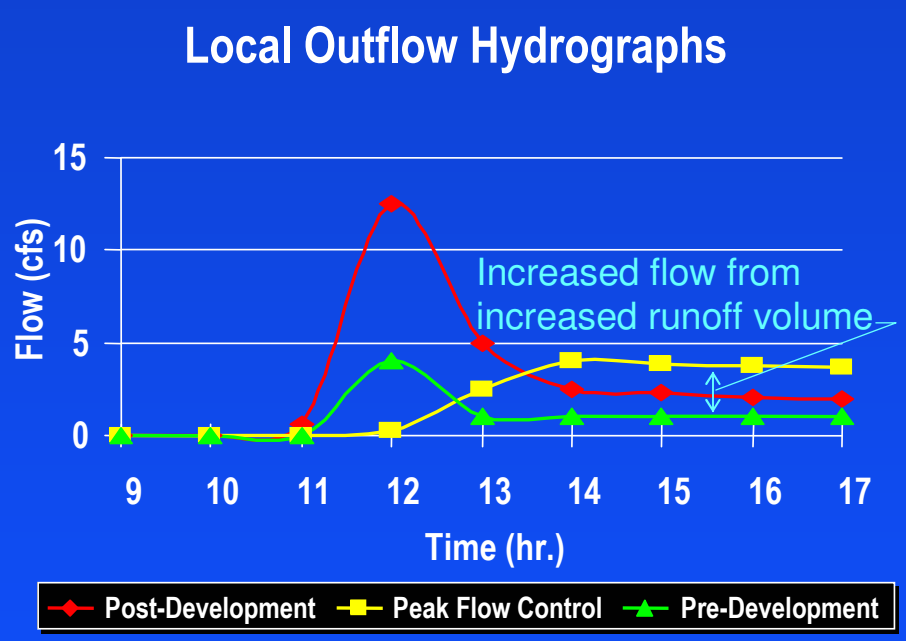
Effect of Increased Runoff Volume





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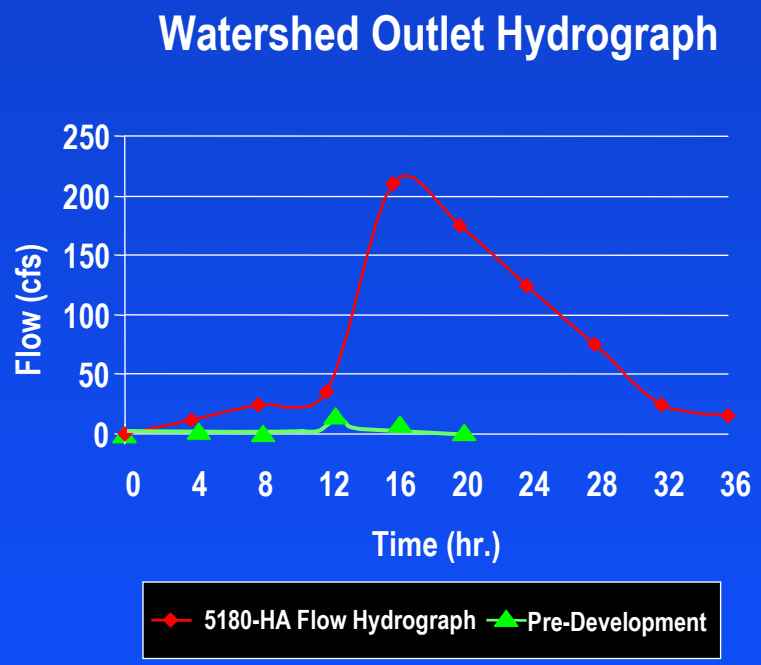
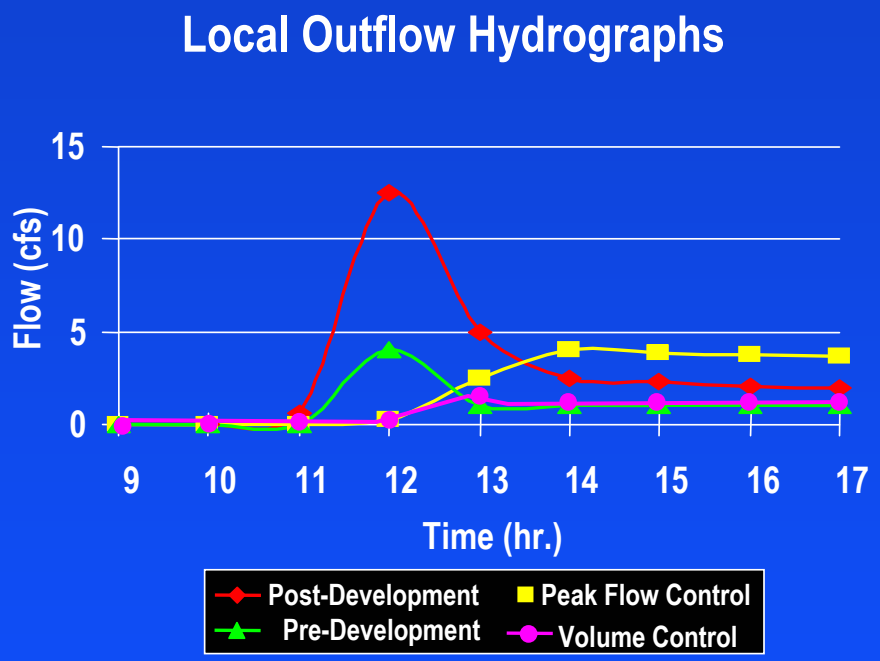
Volume Control





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Runoff Management Hierarchy

- Preservation of the natural features of development sites, including natural storage and infiltration characteristics
- Preservation of existing natural streams, channels, and drainage ways
- Minimization of new impervious surfaces
- Conveyance of storm water in open vegetated channels

Runoff Management Hierarchy cont.

- Construction of structures that provide both quantity and quality control, with structures serving multiple sites being preferable to structures serving individual sites
- Construction of structures that provide only quantity control, with structures serving multiple sites being preferable to structures serving individual sites

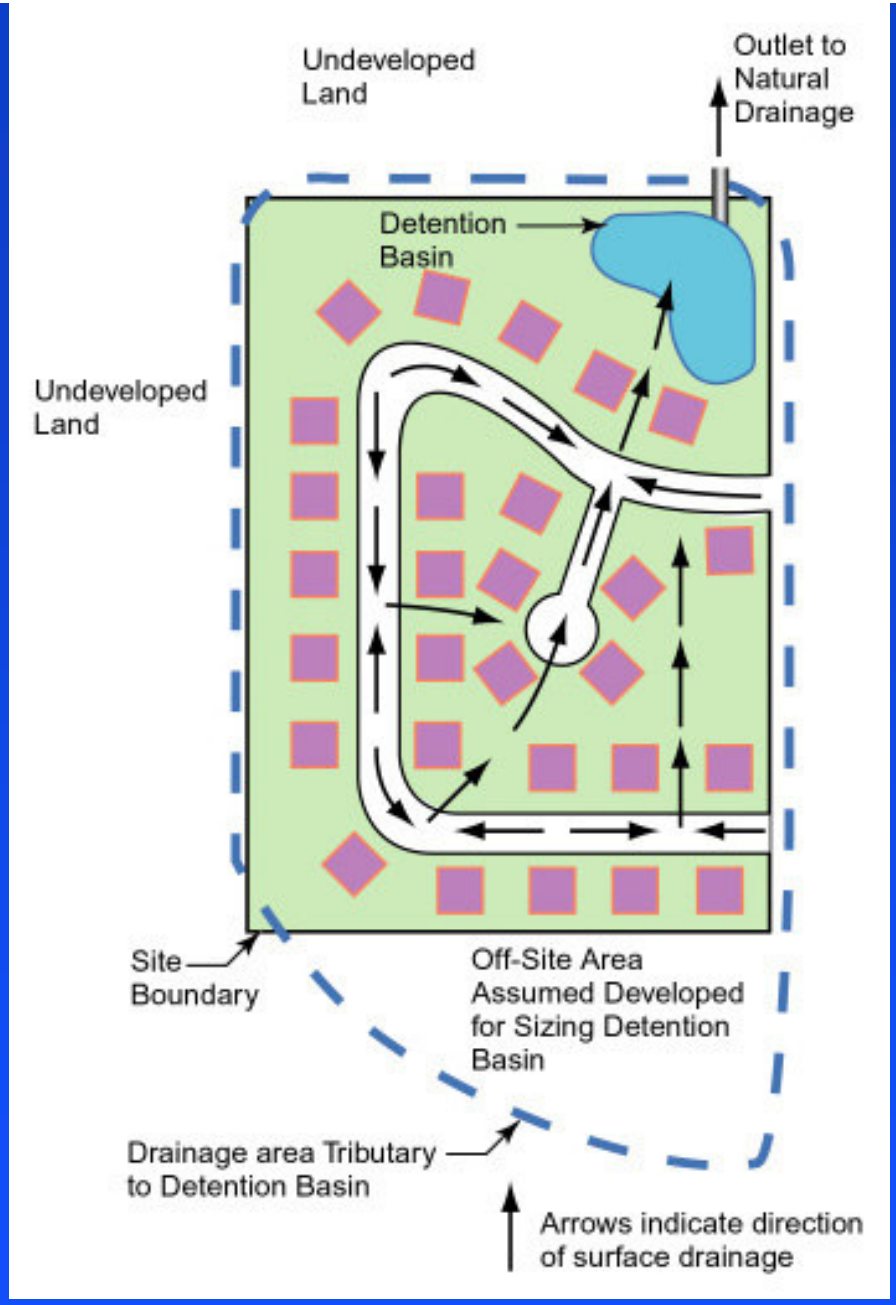
Release Rate Concept

- Uniform standard to be applied to development outflows to control downstream increases in flow and stage and to control increases in runoff volume
- Simple calculation to determine allowable peak outflow (cfs/acre) for typical development sites

Release Rate Approach

- Flow draining from the site in the 100-year event is limited to a maximum rate of 0.5 cfs/acre
- Flow draining from the site in the 2-year event is limited to a maximum rate of 0.15 cfs/acre

Single Site


Undeveloped Land
Outlet to Natural Drainage
Detention Basin
Undeveloped Land
Site Boundary
Off-Site Area Assumed Developed for Sizing Detention Basin
Drainage area Tributary to Detention Basin
Arrows indicate direction of surface drainage

Volumetric Approach

- The total volume of runoff discharged from the site is limited to the total volume of runoff discharging from the existing site during a prescribed critical time period
- Outflow volume must be maintained in both the 100-year and 2-year events

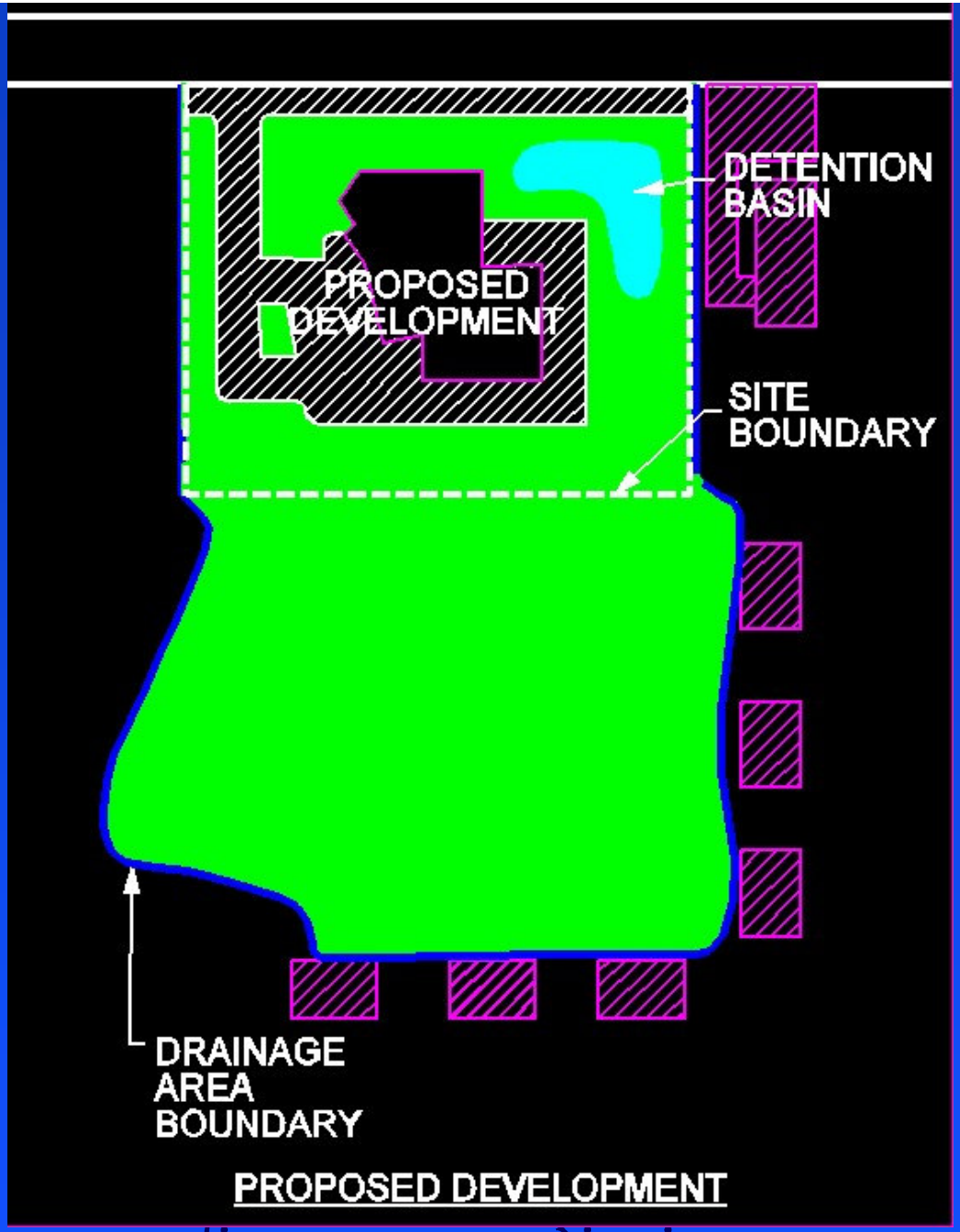
Volumetric Approach

- Intended to control impacts of increased runoff volume from development
- Based on development runoff hydrograph and timing of watershed
- Detailed analysis for more hydrologically complex development sites

Uses/Applicability

- The VDP is applied in complex situations where:
  - Discharges from offsite areas are passed through the pond being designed
  - Discharges from undisturbed onsite areas are passed through the pond being designed
  - Onsite natural storage will be incorporated into the analysis

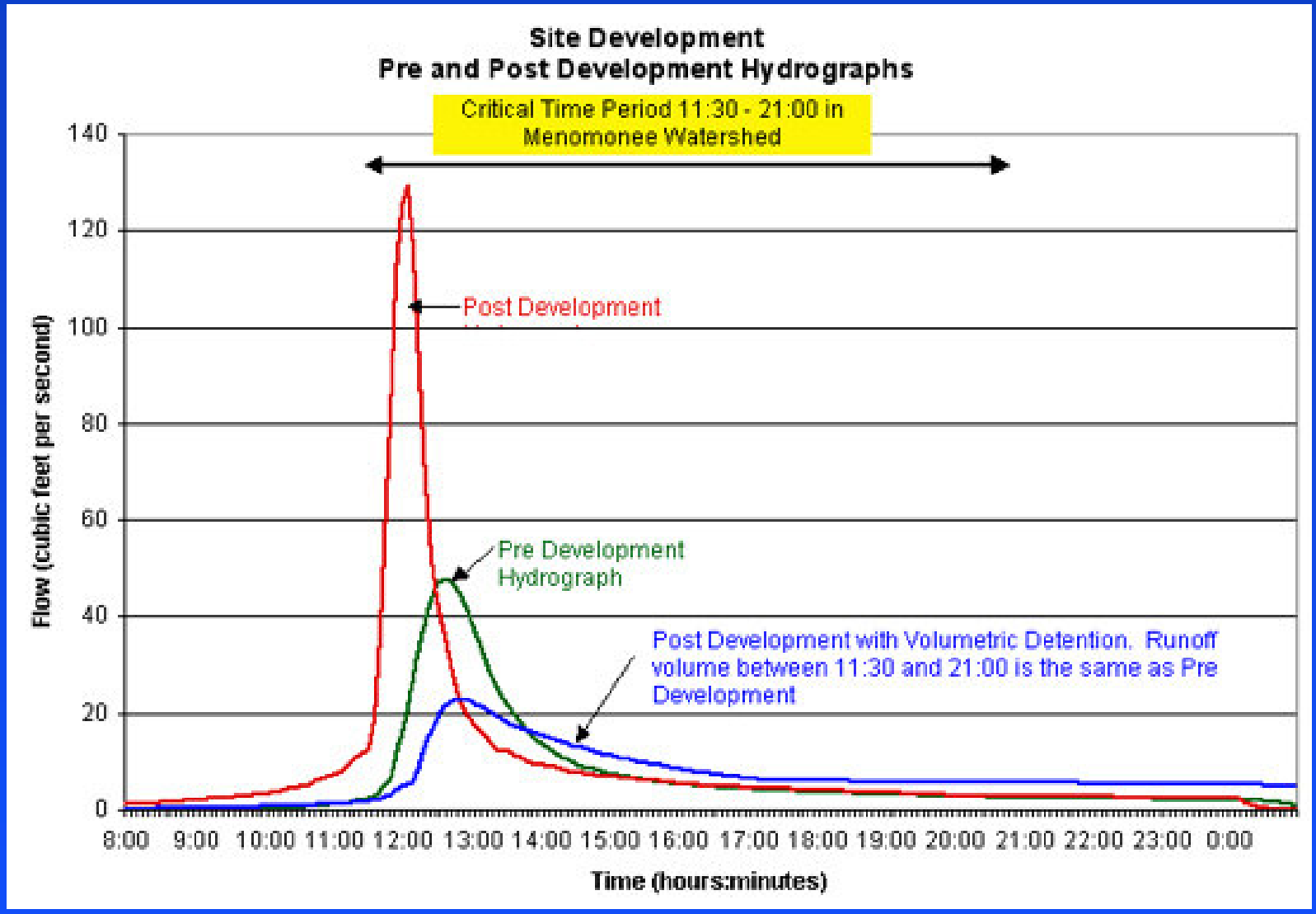
Proposed Site



Principle - Definition

- The VDP is essentially a method for controlling the volume of storm water discharge over time
- The VDP controls the volume for a portion of the flood known as the critical time period
- The overall runoff volume must be controlled, not just the peak of a site runoff hydrograph

Hydrograph Illustration



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Critical Time Periods by Watershed

Basin	Length of Critical Period (hr)
Fish Creek	1.5
Kinnickinnic River	1.75
Lincoln Creek	1.5
Menonomonee River	9.5
Milwaukee River	35.5
Oak Creek	15
Oak Creek*	6
Root River	7.75

*Upstream of Puetz Road

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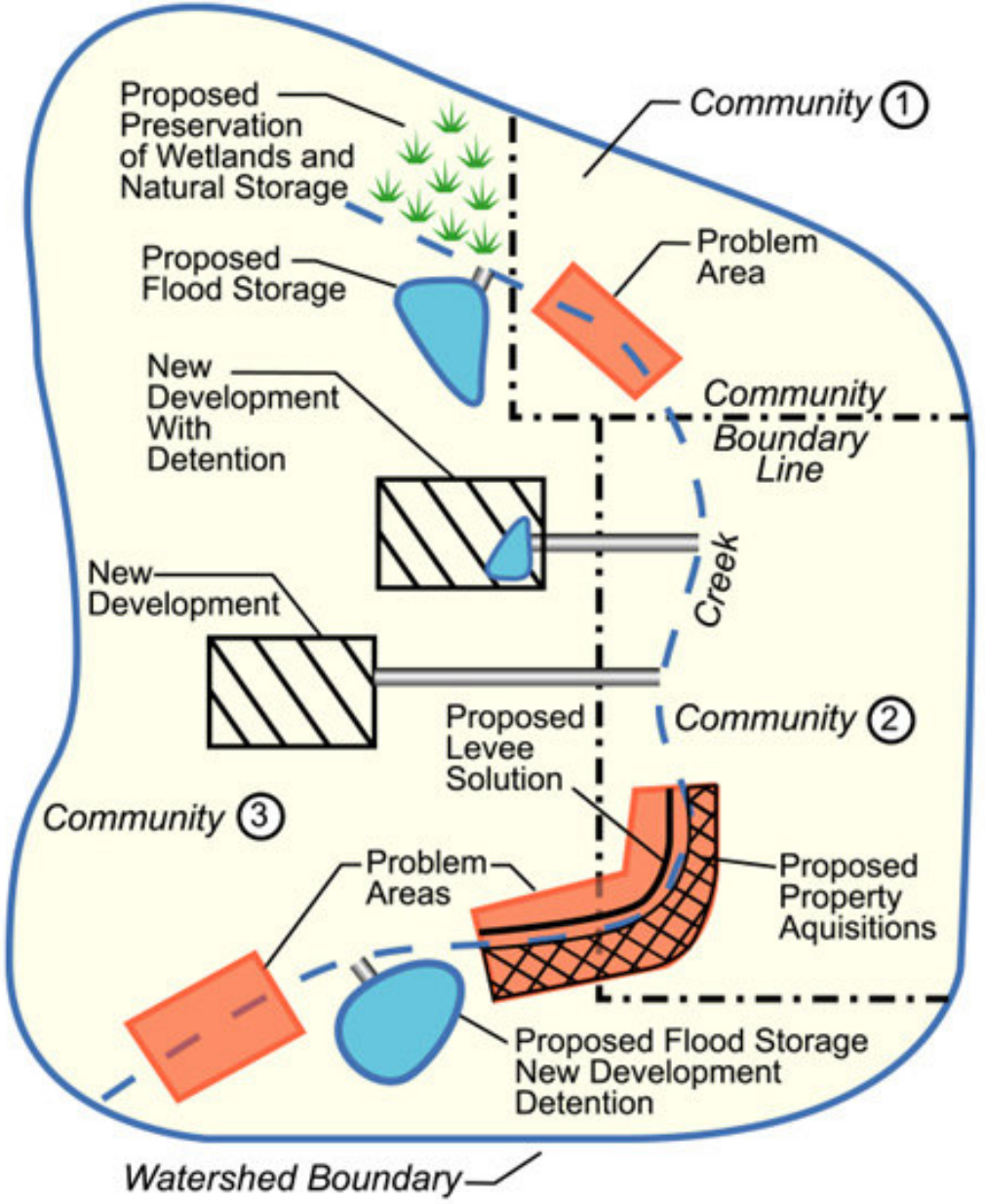
Watershed Plan Approach

- A comprehensive flood management plan for a subwatershed or watershed that:
  - Uses future development conditions
  - Employs acceptable analysis techniques
  - Preserves runoff volumes during the critical time period of the watershed
  - Does not increase flows or stages downstream in the watershed

Watershed Plans



Summary

- The 0.5 cfs/acre release rate will effectively manage the increased runoff from development across the District
- Utilize a District-wide 100-year release rate of 0.5 cfs/acre and a 2-year release rate of 0.15 cfs/acre
- Apply these release rates uniformly across the District to minimize multiple standards between watersheds and within communities
- Provide guidance for detailed volumetric analysis of complex sites, multiple sites or stormwater system planning

Low Impact Development (LID) Practices

- **Residential**
  - **Rain Barrels**
  - **Rain Gardens**
  - **Cisterns**
- **Commercial/Industrial**
  - **Green Parking**
  - **Porous Pavement**
  - **Bioretention**
  - **Green Roof/Storage**

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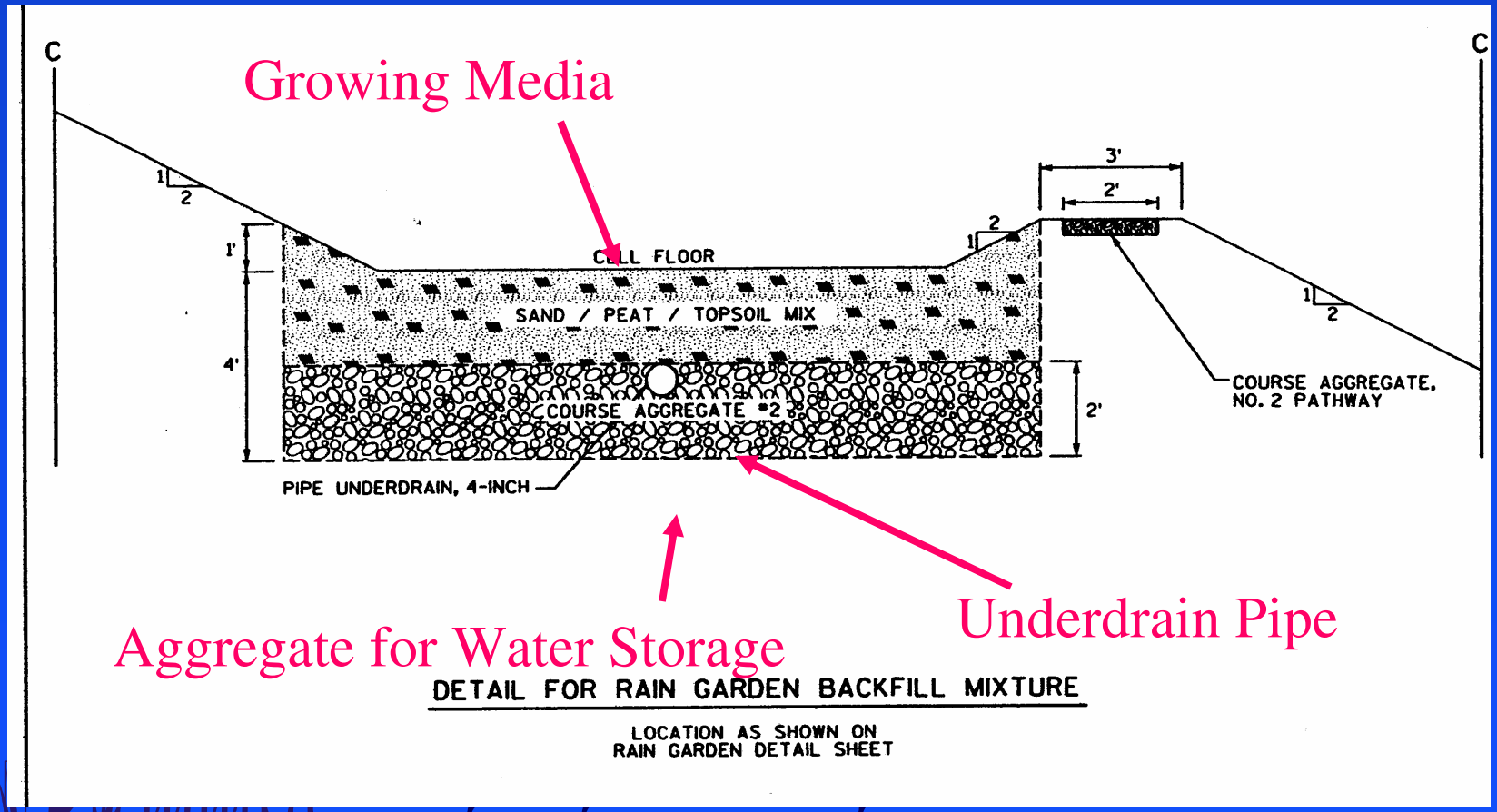
Local Best Management Practices

- Rain Gardens - auto recycling centers
  - **Reduce the volume and rate of runoff**
  - **Absorb and filter pollutants**
  - **Require minimal maintenance**


Madison, WI

Bioretention Design



Bioretention

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Maryland

Source: City of Portland, OR


Lake Delton, Wisconsin

Porous Pavements

Reduce runoff by promoting infiltration

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Local Best Management Practices

- **MMSD Headquarters**
- **Installed Summer 2003**
- **435 containers in “green grid” container system**
- **Covers 4000 square feet**

Green Roof

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Benefits

- **System Benefits**

  - ✓ **Reduced volume of CSOs/SSOs**
  - ✓ **Reduced conveyance, storage, and treatment costs**
  - ✓ **Improvements for watercourses**
  - ✓ **Increased storage available for sanitary flow during wet weather**
  - ✓ **Reduced peak flows and runoff volumes**
  - ✓ **Delayed runoff**
  - ✓ **Local and regional sewerage benefits**

Benefits

- **Environmental Benefits**
  - ✓ Improved water quality
  - ✓ Reduced erosion, scouring, and drainage problems
  - ✓ Improved green space and habitat
  - ✓ Improved energy costs
  - ✓ Water conservation
  - ✓ Impacts on climate
- **Public Benefits**
  - ✓ Enhanced public education and involvement
  - ✓ Improved environmental stewardship

Website Aids

- **MMSD Website (www.mmsd.com):**
  - **Rules and Regulations tab:**
    - Rules
    - Surface Water and Storm Water Guidance Manual
  - **Coming soon. . . .**
    - LID Worksheet
    - Update to guidance manual

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The Clean Water People

Surface Water and Storm Water Rules